

WHAT IS CLAIMED IS:

1. An apparatus for forming a woven-appearing, non-woven fabric comprising in combination:
  - a supply roll of substantially parallel warp yarns defining a warp sheet,
  - 5 a closed loop flexible transfer belt on which said warp sheet can be deposited for linear movement therewith,
  - motor means for driving said transfer belt in a closed loop,
  - a folding system for folding said transfer belt and warp sheet into a substantially cylindrical configuration,
  - 10 an elongated mandrel for supporting said transfer belt and warp sheet in said substantially cylindrical configuration,
  - a weft yarn applicator for wrapping weft yarn around said substantially cylindrical warp sheet as said warp sheet is moved by said transfer belt to form a cylindrical fabric of said warp and weft yarns,
  - 15 a cutter for cutting said weft yarns along the length of said cylindrical fabric to free the fabric from its cylindrical form, and
  - a take-up roll for accumulating said fabric.
2. The apparatus of claim 1 wherein said warp sheet has adhesive thereon  
20 to which said weft yarns are adhered as they are wrapped around said warp sheet.
3. The apparatus of claim 2 further including a heater for softening said adhesive before said weft yarns are wrapped around said warp sheet.
- 25 4. The apparatus of claim 3 wherein said heater is in said mandrel.
5. The apparatus of claim 3 or 4 further including a cooling system for setting said adhesive after said weft yarns have been wrapped around said warp sheet.
- 30 6. The apparatus of claim 5 wherein said cooling system is in said mandrel.

7. The apparatus of claim 1 further including an unfolding system for unfolding from said cylindrical configuration to a substantially flat orientation after the fabric has been cut by said cutter.

8. The apparatus of claim 1 wherein said folding system includes a pair of elongated rods disposed at an angle relative to said transfer belt and positioned for engaging said belt and progressively folding the belt into the substantially cylindrical configuration as the belt moves linearly along said rods.

9. The apparatus of claim 7 or 8 wherein said unfolding system includes a pair of elongated rods disposed at an angle relative to said transfer belt and positioned for engaging said belt and progressively unfolding the belt into a generally flat orientation as the belt moves linearly along said rods.

10. The apparatus of claim 1 wherein said weft yarn applicator includes an elongated tube rotatable about its longitudinal axis and circumferentially surrounding said cylindrically configured transfer belt and warp sheet such that said transfer belt and warp sheet can be moved linearly in a downstream direction through said rotatable tube, a plurality of spools of weft yarn secured to said tube in circumferentially spaced relationship, guide systems for guiding said weft yarns in an upstream direction to an upstream location on said tube, and a laydown member at said upstream location for receiving weft yarns from said spools and depositing the weft yarns on said warp sheet as said tube is rotated and said transfer belt and warp sheet are moved linearly past said upstream location.

11. The apparatus of claim 10 wherein said laydown member has a sloped surface converging in a downstream direction and onto which said weft yarns are wrapped prior to being deposited on said warp sheet from said frustoconical surface.

12. The apparatus of claim 10 further including a plurality of locations along the length of said tube having circumferentially spaced spools of weft yarn.

13. The apparatus of claim 10 or 12 further including a yarn tensioning system for creating substantially uniform tension in said weft yarns before they are deposited onto said laydown member.

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14. The apparatus of claim 10 or 11 wherein said laydown member is a non-rotatable ring surrounding said cylindrically configured transfer belt and warp sheet.

10 15. The apparatus of claim 14 wherein said laydown member is selectively linearly movable along the length of said cylindrically configured transfer belt and warp sheet.

15 16. The apparatus of claim 13 wherein said tensioning system includes a generally cylindrical surface along which said weft yarns can be engaged for frictionally inhibiting sliding movement of the weft yarns to create tension therein.

20 17. The apparatus of claim 16 further including adjustment means for selectively adjusting the length of the generally cylindrical surface along which the weft yarns are engaged.

18. The apparatus of claim 17 wherein said tensioning system is on said rotatable tube.

25 19. The apparatus of claim 13 wherein said tensioning device is an adjustable spring biased device for creating a selected tension in a weft yarn passing therethrough.

30 20. The apparatus of claim 19 wherein there is a tensioning device associated with each spool of weft yarn.

21. The apparatus of claim 19 wherein said device includes a fixed plate and a movable plate, and wherein the movable plate is spring biased toward the fixed plate such that a weft yarn slidably positioned between the plate is yieldingly resisted in movement.

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22. An apparatus for wrapping weft yarns around a cylindrically configured sheet of warp yarns comprising in combination:

an elongated tube rotatable about its longitudinal axis, said tube circumferentially surrounding said cylindrically configured sheet of warp yarns such that said warp yarns can be moved linearly in a downstream direction through said rotatable tube, means for moving said sheet of warp yarns linearly through said rotatable tube, a plurality of spools of weft yarn secured to said tube in circumferentially spaced relationship, guide systems for confining and guiding said weft yarns in an upstream direction to an upstream location on said tube, and a laydown member at said upstream location for receiving weft yarns from said spools and depositing the weft yarns on said warp sheet as said tube is rotated and said warp sheet is moved linearly past said upstream location.

23. The apparatus of claim 22 wherein said laydown member has a sloped surface converging in a downstream direction onto which said weft yarns are wrapped prior to being deposited on said warp sheet from said sloped surface.

24. The apparatus of claim 22 further including a plurality of locations along the length of said tube having circumferentially spaced spools of weft yarn.

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25. The apparatus of claim 22 or 24 further including a yarn tensioning system for creating substantially uniform tension in said weft yarns before they are deposited onto said laydown member.

26. The apparatus of claim 22 or 23 wherein said laydown member is a non-rotatable ring surrounding said cylindrically configured transfer belt and warp sheet.

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27. The apparatus of claim 26 wherein said laydown member is linearly movable along the length of said cylindrically configured transfer belt and warp sheet.

5 28. The apparatus of claim 25 wherein said tensioning system includes a generally cylindrical surface along which said weft yarns can be engaged for frictionally inhibiting sliding movement of the weft yarns to create uniform tension therein.

10 29. The apparatus of claim 28 further including adjustable means for selectively adjusting the length of the generally cylindrical surface along which the weft yarns are engaged.

15 30. The apparatus of claim 29 wherein said tensioning system is on said rotatable tube.

31. The apparatus of claim 25 wherein said tensioning system is an adjustable spring biased device for creating a selected tension in a weft yarn passing therethrough.

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32. The apparatus of claim 31 wherein there is a tensioning device associated with each spool of weft yarn.

25 33. The apparatus of claim 31 wherein said device includes a fixed plate and a movable plate, and wherein the movable plate is spring biased toward the fixed plate such that a weft yarn slidably positioned between said plates is yieldingly resisted in movement.

30 34. A method of forming a woven appearing non-woven fabric comprising the steps of:

providing a supply of elongated side-by-side warp yarns defining an elongated warp sheet,

forming said warp sheet into a substantially cylindrical configuration  
and moving it along a linear path,  
surrounding said cylindrically formed warp sheet with an apparatus for  
transversely wrapping weft yarns around said warp sheet,  
5 wrapping weft yarns transversely around said warp sheet as it is moved  
linearly past said apparatus,  
cutting said weft yarns along the length of said cylindrically formed  
warp sheet, and  
accumulating said warp sheet with weft yarns applied thereto.

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35. The method of claim 34 wherein said warp sheet is provided with an  
adhesive scrim thereon.

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36. The method of claim 35 further including the step of softening said  
adhesive with heat before wrapping said weft yarns.

37. The method of claim 36 further including the step of cooling said  
adhesive after wrapping said weft yarns.

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38. The method of claim 34 further including the step of unfolding the  
cylindrically formed warp sheet after said weft yarns have been cut to establish a  
relatively flat warp sheet with weft yarns applied thereto.

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39. The method of claim 38 wherein said flat warp sheet with weft yarns  
applied thereto are accumulated on a drum.

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40. The method of claim 34 further including the step of providing said  
apparatus with a plurality of circumferentially spaced spools of weft yarns for  
wrapping around said warp sheet.

41. The method of claim 40 further including the step of providing said  
apparatus with an elongated rotatable tube on which said plurality of spools are

mounted and further including the step of providing a plurality of circumferentially spaced spools of weft yarns at a plurality of locations along the length of said tube.

42. The method of claim 41 further including the step of providing means  
5 on said tube for delivering all of the weft yarns from said spools to one end of said tube.

43. The method of claim 42 further including the step of providing a  
laydown ring at said one end of said tube and depositing the weft yarns onto said  
10 laydown ring and subsequently laying the weft yarns onto said warp sheet from said laydown ring.

44. The method of claim 43 further including the step of tensioning said  
weft yarns before depositing them onto said laydown ring such that the tension in the  
15 respective weft yarns is substantially equal as the yarns are deposited onto said laydown ring.